

08/12/2002

To: Federal Communications Commission
From: IEEE/Power System Relaying Committee

In the matter of NPRM FCC 02-136, ET Docket No. 02-98:
Proceeding to allocate new frequency bands to the Amateur Radio Service:

The IEEE/Power System Relaying Committee (IEEE/PSRC) appreciates the opportunity to submit comments in reply to the remarks of the ARRL and AMRAD.

ARRL:

The ARRL has made it clear that they do not believe that amateurs will interfere with PLC users. In their comment summary they said, "The issues are not complex, and compatibility between Amateur use in the subject bands and any other radio services is not a substantial concern in any of the three cases." Frankly, the issues are complex, and the utilities are very concerned. However, PLC is not a radio service, and ARRL is quick to point out several times in both the original proposal and their comments that PLC is unlicensed, has no allocation and is afforded no protection from interference from any user.

In the W1AW Bulletin 22 March 31, 1999 The league said,

SB QST @ ARL \$ARLB022
ARLB022 ARRL rebuts late-filed power industry arguments in LF proceeding

ZCZC AG22
QST de W1AW
ARRL Bulletin 22 ARLB022
From ARRL Headquarters
Newington CT March 31, 1999
To all radio amateurs

SB QST ARL ARLB022
ARLB022 ARRL rebuts late-filed power industry arguments in LF proceeding

The ARRL has rebutted assertions that amateur LF allocations at 136 and 160 kHz could lead to interference with utility-operated power line carrier (PLC) systems. The unallocated and unlicensed Part 15 PLC systems are used by electric utilities to send control signals, data and voice. At the same time, the League urged the FCC to issue a Notice of Proposed Rulemaking to open the LF bands up to amateurs.

Last October, the League petitioned the FCC to create low-frequency Amateur Radio allocations at 135.7 to 137.8 kHz and 160 to 190 kHz. The ARRL proposed permitting CW, SSB, RTTY/data, and image emissions at a maximum power level of 2 W effective isotropic radiated power. The utilities' PLCs operate between 10 and 490 kHz.

The comments in question--from four parties including Commonwealth Edison and Mark Simon--arrived at the FCC well beyond the December 23, 1998, comment and the January 7, 1999 reply comment deadlines. They also appear to be the only comments filed on behalf of the power industry.

The League has requested that the FCC strike the late comments from

the record, but it also rebutted their substance in case the FCC decides to accept them anyway.

The League debunked Simon's suggestion that ham interference could lead to dire consequences to unlicensed PLC systems. The League said Simon fails to explain why a marginal-level amateur signal would cause problems ''where loud static crashes in the same bands do not.''

The League said PLC systems already have been shown to operate effectively ''in an environment of extremely high power government stations using thousands of watts of EIRP.''

The League also took ComEd to task for suggesting that hams be obliged to protect PLC systems against interference. The ARRL pointed out that PLCs have ''no incumbent allocation status'' and are not entitled to protection from licensed systems. The ARRL acknowledged existence of the PLC systems in its October petition and provided a technical analysis indicating that amateur interference to PLCs was unlikely.

The League suggested that the utilities make available an industry database of PLC operating parameters that hams could consult as a guide to avoid interference. It concluded that the FCC should not make allocations decisions ''based in whole or in part on the presence or absence of Part 15 devices in a particular band segment'' since the devices have no inherent allocation status.

The League said it remains willing to address any interference cases that might arise and urged the FCC to issue a Notice of Proposed Rulemaking on the ARRL's request ''without further delay.''

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How can the ARRL make statements concerning interference? How can they relate "loud static crashes" to a narrow band signal at the exact frequency of a PLC receiver. Additionally, there has been no attempt to correct incorrect assumptions made in the original ARRL proposal. Understanding this attitude, the Commission needs to question the ARRL's technical credibility in this matter. Also in question is what the ARRL's position would be if an amateur was to cause a power outage. What would be the position of the amateur? How would the Commission handle this? While we do not feel that an amateur would deliberately interfere with PLC, we do believe that the ARRL's attitude, and failure to understand how PLC functions would put all responsibility on the amateurs back.

The ARRL believes that its membership, a portion being the 650,000 amateurs in the United States, must have this band. They ask for the allocation to be "implemented immediately". If 65 amateurs were interested in the LF allocation the interest level would be 0.01 %. 650 comes to 0.1 %. Commercial equipment availability would make this higher. An investment not worth the price of the risk.

The purpose of the ARRL in requesting a LF allocation is to provide an allocation to amateur radio for experimentation. LF is noisy, and the bandwidth is narrow. Antennas are inefficient, and generally large. Propagation is not well understood. These represent the challenges. This being accepted, all experiments can be carried out using milli-watt levels except long distance propagation. Users operating under part 15 have proved that high power is not required to experiment.

Amateurs have demonstrated that they can co-exist with other uses. However this has not been done without interference. If a PLC receiver is interfered with, the interference will be more than just a

nuisance. PLC can not incorporate technology to make itself more immune to interference like spread spectrum use in 902 - 928 MHz. Section 6 of the ARRL's comments say "the Amateur Service has a long history of compatible secondary operation with primary status services conducting long-distance communication, due to the Amateur's frequency agility and the normal, and virtually universal practice of listening to a frequency prior to transmitting on it." Amateurs will not be able to use frequency agility as the NPRM allocation is 2.1 kHz wide and PLC is 4 kHz. They can not listen to a frequency prior to transmitting to avoid interference. The ARRL has failed to understand how PLC is used and what the ramifications of interference will be. They believe that if static crashes don't interfere with PLC so an amateur won't. Terms such as "unlikely", "virtually guarantee", "no reason to assume", provide little comfort that a power interruption will not happen. Their technical assessment based on GWEN is irrelevant.

The ARRL asking for 2 watts EIRP as well as a 160 kHz to 190 kHz allocation. They have clearly said that they are not concerned that they may interfere with PLC users. The Commission must weigh the advantage to the public, in technological advancements by less probably less than 1% of the amateur hobbyists, vs. the reliable delivery of electric power.

AMRAD:

AMRAD has performed unlicensed experimentation on LF for many years. They also championed experimental licenses. A letter from Bob Magraw to Dave Summer published in the "Lowdown" may have jump started the ARRL into making their allocation request. This letter is public at <http://frodo.brudershof.com/longwave/notebook/> November of 1994. It would be beneficial for the Commission to read this letter. Mr. Magraw suggests that the ARRL say that if GWEN doesn't bother utilities, with all its watts, then hams would be unlikely to cause interference. The commission would also find it beneficial to look at other LF group newsletters. Comments from potential users of LF indicate their thoughts about interference. Comments include utilities having no allocation and only having "squatter" rights.

AMRAD feels that a LF allocation is necessary to maintain the pool of expertise in LF technology for private industry and governmental laboratories. Radiated LF is an obsolete technology for commercial applications. There has been much advancement in using the LF spectrum over distribution power lines for home automation and data communications. To suggest that amateur radio needs to supply the talent pool is illogical. Utilities have had much success finding people with the attributes to develop the specialized skills to work on PLC. Few come out of high school or college with these talents. The importance of amateur radio is the same as college, to develop an understanding of electronic and communication principals so that this knowledge can be built on. In fact, many PLC technicians and engineers across the United States are licensed amateurs and have had no prior experience with LF. Their experience is practical and general.

AMRAD discusses a LF contact made between Canada and the U.K. using one-watt ERP. Twelve members of AMRAD were granted experimental licenses allowing the development of an E-field antenna design and an innovative low-noise LF converter design. Receivers employing DSP are being investigated. These experimental licenses holders were authorized to operate one watt. There has been no justification as to why one milliwatt under existing part 15 would not have produced these same results. Nor has there been any justification on why using one watt was not sufficient. Yet both the AMRAD and the ARRL requests more power. Neither AMRAD nor the ARRL indicated that current experimentation and would stop if a LF allocation was not provided.

General:

There has been no mention by either the ARRL or AMRAD on the possibility of PLC interfering with Amateur radio. The newsletters and internet message boards show that that experimenters operating under part 15 can hear PLC. The LWCA newsletter from October 1998 (<http://www.lwca.org/mbarchiv/msg1098.htm>) (copyright prevents duplication here) has an a message

saying that the use of the LF allocation in Central California looks grim for the West Coast. Six PLC frequencies are mentioned at levels as high as S9. Under the NPRM an Amateur could complain that they are being interfered with and demand, within the rules, that the PLC be turned off. As many as six lines would be without their high speed protection. A single fault would have dire consequences to the reliability of power. Other users have similar complaints. These PLC signals, can be easily heard at great distances. Day and night. The utilities must be protected from having to shut down and operate without essential line protection.

It should be noted that although AMRAD is currently actively experimenting in the LF spectrum, be it under experimental licenses or part 15, they did not request an allocation in the 160-190 bandwidth.

Neither organization suggested what actions would take place if an amateur were to cause a power system outage.

Neither organization discussed the need or usefulness of having the UTC database made public.

Both organizations site co-operation with GWEN as proof that PLC is immune to interference. It must be noted that PLC has had to be relocated due to interference. PLC was coordinated with the UTC database which advised users so GWEN interference could be avoided.

The 54 GWEN sites were said to operate at 3000 watts into a 299 foot antenna transmitting 6 seconds each hour. GWEN used a wide bandwidth, 3 kHz signal. Narrow band signals at the exact PLC trip or block frequency provide far more usable signal to a PLC receiver. It is practical to assume that there would be some amateurs using 300 foot antennas so a direct comparison can be made.

The noise relationship between different bandwidths is $10 \log (BW/BW_{ref})$. The noise from GWEN would be 30 dB less after being demodulated by the PLC FSK receiver. The power of GWEN is roughly 30 dB higher than the proposed 1 watt EIRP. To correlate interference from GWEN and amateur radio verbally is not sufficient to demonstrate that PLC will not be interfered with. A study of each GWEN transmitter, its frequency, and its proximity to PLC systems of the same frequency has not been presented. A study of modulated interference and PLC receiver characteristics have not been presented. Previous studies relating GWEN and PLC are not directly extensible to amateur radio and PLC.

Summary:

ARRL and AMRAD represent the community of potential operators that would use a LF allocation. Their comments have shown that a LF allocation would allow experimentation. They have not shown how this experimentation would benefit society as a whole, however the ARRL sites their need as urgent. The ARRL has not proven that interference will not occur and in fact has clearly indicated that incumbent PLC users will not be able to do anything about it if it does happen. The Commission recognizes that amateur operations could interfere with power system protection. Request for an amateur allocation was denied in 1978. Today, PLC is even more important since the power systems are loaded to higher levels.

AMRAD indicates that much has been accomplished already by experimental license holders. Transcontinental contacts have been made using one watt however there is a request for higher power. By identifying PLC as unlicensed and unprotected and not identifying what actions would take place should interference occur, it is clear that ARRL and AMRAD will put blame on the utilities should an outage occur. The NPRM has offered no recourse for utilities.

By leaving the rules as they currently stand, PLC will remain reliable. By allowing any amateur radio operation, there will be interference to PLC receivers. Some of this interference will result in the failure of PLC to operate or a false operation. Some may result in only momentary alarms resulting in unnecessary attempts at corrective maintenance. Amateurs will be able to force utilities to shut down PLC if they complain about interference.

The IEEE/PSRC opposes the LF allocation recommended in 02-98. If the Commission believes that there is a vital need for experimentation in this spectrum by a limited number of amateurs, experimental licenses should be given. Coordination, identification of the nature of the experiments, the exact location, and frequency assignment, can assure that power system reliability is not affected. Experiments would be logged with times noted. If an erroneous operation occurs, the exact cause can be identified. Future outages could be avoided. AMRAD has shown experimental licenses can deliver results. The ARRL's comments shows no justification for urgency, a lack of understanding on how PLC works, soft words regarding interference, no facts, and a lack of respect for incumbent users because of license status.

Respectfully Submitted,

Mark Simon
Chairman Relay Communications Subcommittee
IEEE - Power System Relaying Committee

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